UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL

GENERAL

E/ESCAP/STAT.6/9
27 September 1985

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Committee on Statistics

Sixth session
19-25 November 1985
Bangkok

DEVELOPMENT OF ECONOMIC STATISTICS

(Item 6 of the provisional agenda)

REPORT OF THE ASIA-PACIFIC MEETING OF STATISTICIANS ON INPUT-OUTPUT TABLES

Note by the secretariat

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I. ORGANIZATION OF THE MEETING

1. The Asia-Pacific Meeting of Statisticians on Input-Output Tables, organized by the secretariat of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in collaboration with the Government of Japan, was held in Tokyo from 13 to 19 March 1984. Financial support and host facilities were generously provided by the Government of Japan.

Attendance

2. The Meeting was attended by 32 participants from 13 members and associate members of ESCAP, namely, Australia, Fiji, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand and the United States of America. The countries were generally represented by senior officers associated with the compilation or use of input-output tables in national statistics or planning offices, or in central banks. Representatives of the United Nations Statistical Office, the Statistical Institute for Asia and the Pacific (SIAP), the Asian Development Bank (ADB), the Commission of the European Communities and the World Bank also participated.

3. Mr. W. Leontief, Professor at New York University and Mr. M. Morishima, Professor at London School of Economics and Political Science, attended the Meeting by invitation. Mr. Leontief delivered a special lecture on the topic "Development of input-output analysis" and Mr. Morishima delivered a special lecture on the topic "Classical, Neoclassical and Keynesian in the Leontief framework". Both participated in the discussions during the meeting.

Opening addresses

4. The Chief of the ESCAP Statistics Division welcomed the dignitaries, participants and resource persons to the Meeting. He noted that gatherings of that nature provided a valuable opportunity for country participants to exchange views and relate their experiences and thereby learn from each other. Through the knowledge obtained, countries might avoid costly duplication of effort in the development, compilation and analytical procedures, and avoid repetition of errors.

5. In his inaugural address, His Excellency Mr. Takashi Sakura, Administrative Vice-Minister, Administrative Management Agency, Government of Japan, recalled his interest and efforts in introducing input-output tables

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into Japan 30 years earlier when he had worked in the Office of Statistical Standards of the Government of Japan. He observed that interdependency between economies had considerably increased since then, requiring closer international co-operation in various fields. The meeting on input-output tables was thus significant and opportune in that regard. It should contribute to the economic and social development of countries through a proper understanding of the economic structure for both domestic economic policy-making and the development of assistance programmes. It should also promote the development of statistics in the countries of the ESCAP region.

6. The Executive Secretary of ESCAP, in his message expressed his sincere gratitude to the Government of Japan for its generous provision of financial support and host facilities for the Meeting. He observed that indigenous capability-building among developing countries was a major thrust in the programme of work of ESCAP. Technical meetings were an important and useful means for that purpose. Such meetings were usually well supported since developing countries were keen to advance their statistical expertise in order to produce the reliable information needed for planning and monitoring development programmes and for assessing progress.

7. The Executive Secretary noted that input-output tables were a technique for understanding the structure and the interrelationships of various economic sectors. Such tables were also a part of the national accounts system, an aggregative measure which was more familiar to most decision makers. However, owing to a lack of sufficient integration, it was not uncommon for diverging estimates of aggregates such as gross domestic product to result from the compilation of input-output tables on the one hand, and national accounts on the other. The Executive Secretary observed that the Meeting would be looking at that issue in the context of reviewing the United Nations System of National Accounts (SNA). In the process, the Meeting might also consider how best to reflect the nature of technologies adopted by countries, including the presence of significant subsistence activities in many countries, in the basic structure of input-output tables.

8. In his welcoming address, the Director-General of the United Nations Bureau of Japan's Ministry of Foreign Affairs, on whose premises the Meeting was held, noted the importance of statistics in research, analysis and planning.

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Trained manpower was essential for that purpose. He observed that the Meeting should therefore serve as a training opportunity for the participants through the exchange of views and experiences.

Election of officers

9. The Meeting elected Mr. Teruhiko Kondo (Japan) as Chairman and Mrs. Grace Majumdar (India) and Mr. Lau Kak En (Singapore) as first and second Vice-Chairman, respectively. Mr. Paul Gretton (Australia) was elected Rapporteur.

Adoption of the agenda

10. The Meeting adopted the following agenda:

1. Opening of the Meeting.
2. Election of officers.
3. Adoption of the agenda.
4. Input-output tables in the ESCAP region.
5. Special lectures.
6. Compilation of input-output tables:
   (a) Source statistics for input-output tables;
   (b) Methods of compilation of input-output tables;
   (c) Tables on fixed capital, employment, etc.;
   (d) Constant price tables and deflators.
7. Conceptual problems of the System of National Accounts and input-output tables.
8. International comparability of input-output tables.
9. Uses of input-output tables:
   (a) Utilization of input-output tables in economic planning, analysis, policy and projections;
   (b) Use of input-output tables in developing countries;
   (c) Use of input-output tables for energy analysis.
10. Computer support:
   (a) Software packages for compilation of input-output tables;
   (b) Software packages for economic analysis using input-output tables.

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11. Conclusion and future actions.

12. Consideration and adoption of the draft report.

11. The documentation prepared for the Meeting is listed in the annex to the report.

12. The participants and resource persons expressed their warm gratitude to the Government of Japan for providing host facilities and excellent administrative support. The generous hospitality of the Japanese authorities was very much appreciated.

II. INPUT-OUTPUT TABLES IN THE ESCAP REGION

13. The secretariat paper (STAT/MSIOT/3) briefly described the evolution and development of input-output tables in the countries of the region. The Meeting noted that although a few countries had made an early start, and several others had joined somewhat later, many more were currently engaged in developing such tables for their economies. A number of national agencies were generally involved, but the co-ordinating responsibility rested with the central statistical office, the planning agency or the central bank.

14. The Meeting also heard brief statements from the participants on the status of input-output work in their respective countries, based on the papers submitted by them (STAT/MSIOT/CRP.5-16). A summary of country practices is provided below.

Country or area	Reference year	Comments
Australia	1978-1979	Annual tables were compiled; work on tables for 1979-1980 and 1980-1981 was proceeding.
Fiji	1980	The latest tables were an updating of the 1973 bench-mark tables. These bench-mark tables had also been updated to 1977.
Hong Kong	-	The Hong Kong Government had not yet produced a first set of input-output tables. However, it was envisaged that research work would be initiated in the near future, subject to the availability of resources, on preparing input-output tables for 1980.
India	1973-1974	Work on bench-mark tables for 1978-1979 was proceeding. Updated tables had been prepared but not published, for 1979-1980.

Country	Reference year	Coments
Indonesia	1975	Work on tables for 1980 was proceeding.
Japan	1980	The tables for 1980 were bench-mark tables; annual tables were compiled.
Malaysia	1970	Work on tables for 1978 was tentatively scheduled to commence in the second half of 1984.
Philippines	1979	The latest tables were an updating of the 1974 bench-mark tables. Work was being completed on bench-mark tables for 1979.
Republic of Korea	1980	Updated tables were compiled for selected reference years.
Singapore	1978	Began compiling annual tables commencing with 1980.
Sri Lanka	1980	The latest table was relatively aggregative. Work on a table for 1981 was being finalized.
Thailand	1975	Work on tables for 1980 was proceeding.
United States of America	1977	The tables for 1977 were bench-mark tables; annual tables were compiled.

15. In most countries of the region involved in input-output work, 'bench-mark' tables are compiled at five-year intervals. However, such tables were often published only after a significant time-lag from the reference year. In order to provide more timely and up-to date data, one of three approaches was frequently used. First, a number of countries 'updated' bench-mark tables for selected years using a combination of basic data and mathematical estimation techniques; for example, that approach had been used by Fiji, India and the Philippines. Second, other countries compiled annual tables by projecting the results of a bench-mark table forward, using a combination of clerical and mathematical estimation techniques; for example, that approach was being followed in Japan and the United States. Finally, in the case of Australia and Singapore, tables were being compiled on an annual basis using an approach whereby bench-mark estimates were made of selected flows in any one year and the remainder of the flows were estimated mathematically. All flows would be bench-marked over a periodic cycle, for example, five-yearly. The viability for some countries of adopting a system of annual tables was questioned on the grounds of the resources that might be involved and the difficulties that could be encountered if a country faced rapid staff turnover.

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16. The emphasis in the countries was on national tables; nevertheless, in Australia, India and Japan, the need for subnational input-output tables was also voiced, and they were attempted. However, it was recognized that the non-availability of adequate data on such items as trade flows between different parts of the country was a major difficulty. Concerning industry data, countries recognized that there was a lack of sufficiently disaggregated information for key economic sectors. In addition, when censuses and surveys were available, and further analysis of existing data was possible, confidentiality and the practical problems of retabulating data by the minute classifications required for regional work inhibited the development of subnational tables. Nevertheless, special surveys were organized in some countries for specific data. Most countries, however, experienced difficulties in organizing data collection for the household and unorganized sectors.

17. For the valuation of flows, the Meeting noted that countries were increasingly adopting approximate basic values as recommended in SNA, or approximate factor value. Several countries, however, continued to use either producers' or purchasers' values as the central valuation principle. With regard to imports, many countries made the distinction between competitive and complementary (non-competitive) imports; some others recognized the need for that distinction but had not yet adopted it. A number of countries also compiled an imports matrix and thereby provided a measure of the disposition of imports to using sectors.

18. Computers were being used for data analysis and compilation of various tables and matrices, but some countries still faced difficulties owing to a lack of suitable software packages, computer hardware storage and processing capacity, or trained manpower. The Meeting also noted severe restrictions of resources in terms of both technically trained manpower and finances for various operations involved in the planning, organization and preparation of input-output work.

19. A number of countries had made extensive use of the mathematical estimation technique which was called the "RAS" method, in conjunction with more traditional basic data estimation procedures. That technique was used to project a base table to a target reference year in order to provide up-to-date tables as well as to economize on resources. Countries using the

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technique planned to continue doing so in the future and to develop and refine its application. The Meeting discussed the utility of that technique. It was noted that the specification of the "working matrices", the accuracy of input-output flows that were determined in the clerical system, and the need to allow specifically for major economic change by the estimation of certain flows from basic data, were critical to the successful application of the RAS technique. Nevertheless, views differed on the extent to which that technique should be used.

20. The Meeting noted that input-output tables were widely used in the construction of planning models; demand and supply projections of commodities; studies of the detailed structure of the economy; policy formulation in various fields like employment, energy, tourism and prices; determination of priorities in the allocation of foreign exchange, and so on. Input-output tables were also used for import studies of various policies.

21. The Meeting was also informed of the work that the United Nations Statistical Office was planning in the field of input-output tables, including a publication on input-output tables and the establishment of a data bank. The co-operation of member countries was sought in that regard.

22. The Meeting noted the strong support for the development of input-output work from the World Bank, the Asian Development Bank, the Commission of the European Communities and SIAP. The offer in principle by the representative of the Commission of the European Communities of technical assistance to African, Carribean and Pacific (ACP) developing countries for the development of national accounts was gratefully noted.

III. COMPILATION OF INPUT-OUTPUT TABLES

A. Sources and methods

23. The Meeting had before it the paper entitled "Compilation of input-output tables: data and methods" (STAT/MSIOT/1) prepared by a consultant to the secretariat. The paper included a discussion on how input-output tables could be more reliably estimated. It was argued that the SNA framework as sometimes applied to the compilation of current indicator series of national accounts was not necessarily conducive to efficient and reliable collection of data for the detailed structural accounts of production provided by the input-output tables. The table should therefore be regarded as the basic working model

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of the real economy rather than just one alternative working model. Once a reasonably accurate bench-mark input-output transactions table had been established, then the subsequent process of data collection and compilation should be one of annual verification of the estimates of major flows and mathematical estimation of the remaining flows by some reliable technique. The "modified RAS" was recommended. It was further observed that the statistical reliability of the transaction table depended upon how representative it was of the Leontief Input-Output Model. Some major problems in that connection and how they might be solved were examined in the paper under the headings of multiple products, valuation, import valuation and routing, classification and aggregation. It was suggested in the paper that more use of sampling techniques, econometric methods and industrial experts should be made for the preparation of bench-mark flows and for the checking of the accuracy of estimates obtained by mathematical projection. It was further advised that a number of special purpose extensions could be made to the usual transactions tables in order to reflect regional economic activity, government activity, taxation, income distribution, and consumer behaviour. Those extensions would make the input-output tables more useful for policy analysis and specification while at the same time optimizing the use, within an intersectoral modelling framework, of the data that might already be collected.

24. The Meeting commended the consultant on the elucidating exposition given in the paper. During the discussion, opinions were expressed that it would be too restrictive to focus data collection only on the production accounts provided by the input-output model and that the institutional framework of the SNA was required in order to accommodate all data needs for analysis of household behaviour, government policy etc. Other participants, however, felt that there was a way to handle non-activity-based data by the development of a transformation matrix. The concept of the basic input-output model did not imply that no further data should be collected but that the model should serve as a catalyst and should therefore have higher priority in data collection.

25. With regard to sources of data for the compilation of input-output tables, the Meeting felt that both censuses and sample surveys should be used. Some countries used a combination of complete census of some units and sample surveys of other units for collecting data in certain sectors, such as

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manufacturing. Data collected for the national input-output tables were made available subject to confidentiality and other considerations for the purpose of estimating subnational input-output tables.

26. On the question of possible cumulative errors where annual updating of tables was done by the modified RAS, the Meeting observed that such a possibility existed since errors could accumulate in a loosely specified estimation model because different sectors were investigated by reference to basic data in different years. Careful specification of the constant estimation model and vigilance were therefore advisable in the use of the modified RAS method (or any other mathematical estimation technique).

27. With regard to projecting the imports matrix forward in the RAS calculation, the Meeting agreed that difficulties would be encountered in maintaining the high degree of accuracy required for analytical purposes. It was suggested that there should be a world matrix of input-output flows, not just the separate national tables showing import flows, if success in fully analysing world trade flows was to be achieved. The Meeting noted that an earlier study by a group had predicted, through a world input-output model, the serious balance of trade problems that were actually occurring today for the developing countries.

28. The Meeting recognized that the purpose of using annual updating techniques was to cut down on the costs of any one table. That was possible since not all sectors would require investigation each year. If the time between tables was extended, more sectors would require full investigation for any one table and therefore the costs assigned to the compilation of a particular table would be necessarily larger than if the work was spread over a number of tables.

29. The Meeting noted that abstract mathematical modelling might be of limited practical use in current economic policy-making. Concrete empirical approaches based on common sense and presented in a disaggregated form that could be interpreted by economic agents could help solve problems better. Input-output studies, if properly conceived, would be extremely useful in policy analysis.

30. The Meeting also noted the paper entitled "Estimating input-output tables from scarce data: experiences of the United States Census Bureau's Center for

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International Research" (STAT/MSIOT/CRP.4) presented by the participant from the United States of America. The paper summarized scarce data estimation techniques used in constructing input-output tables for the Union of Soviet Socialist Republics and China. Those techniques included means for estimating portions of the inter-industry demand matrix by use of surrogate data (representing missing inter-industry flows with data from available input-output sectors, from regional input-output tables, and from price-adjusted input requirements from input-output tables of other countries), updating input-output tables using the RAS technique and RAS variants, estimating value-added and final demand quadrants from scarce data, and estimating price indices for converting current price tables to constant prices.

31. In the discussion that followed, the Meeting noted that the surrogate data estimation technique had been tested for accuracy on the Soviet input-output table with encouraging results. Furthermore, with regard to the doubt as to whether input coefficients could be used to assess the accuracy of surrogate input-output requirements since they tended to change relatively quickly, the Meeting felt that surrogate data estimation techniques should be used with some care as it was indeed possible for coefficient matrices of certain countries to change quickly. It was suggested that price indices could be estimated using information about foreign currency exchange rates; the possibility of using information obtained from international comparisons of purchasing power parities was also suggested.

B. Fixed capital matrix and employment-occupation matrix

32. The fixed capital stock table was intended to capture the fixed capital assets of each industry and to provide a dynamic function for preparation of policy and planning models. The Meeting therefore considered the purpose and classification of fixed capital, by type and sector, capital function classification, nature of a fixed capital matrix, evaluation of gross and net capital stock, data sources and application of the stock-related ratios. It also considered the definitions, classifications and data sources relating to employment with the objective of deriving capital-output and capital-employment ratios. The basis for those considerations was document STAT/MSIOT/4, which was prepared by a resource person from the host country and which was commended by the Meeting. It was noted that very few countries had attempted to compile capital stock matrices; Japan and the Republic of Korea were important examples of countries for which tables were available.

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33. Problems were raised relating to the coverage of capital stock, especially in respect of land, animal, plant and oil resources. The Meeting considered that normally non-reproducible tangible assets should not be included. However, newly-cultivated land, increment of land and improved land could be included in capital stock. It would be useful to compile a land utilization matrix separately from a fixed capital matrix so that the users could decide to include or exclude land as they wished. As regards their estimation of the value of the assets, the Meeting felt that in developing countries, data on land, animal and plants might be collected at the time of censuses of agriculture and forestry. Some data could even be collected during farm household surveys.

34. Problems relating to capital stock by industry were also considered, especially in respect of leasing. Some of the developing countries with limited resources found it difficult to make an estimate of capital stock and wished to utilize data contained in feasibility studies for various projects in order to arrive at an incremental capital-output ratio. In that connection, it was considered that wherever possible data on investment might also be collected directly from enterprises in countries where capital stock was not large and where ownership might be concentrated in a relatively small number of enterprises, in view of the early stages of industrial development in those countries.

35. The Meeting also considered under that subheading the document entitled "Applications of input-output tables in the field of labour affairs" (STAT/MSIOT/5) prepared by the Ministry of Labour of the Government of Japan. The paper noted that input-output tables had been intensively used by Japanese Government agencies for labour market and wage-price repercussion analysis. Input-output labour market research made it possible to estimate employment-generation effect in response to a change in final demand as well as employment implications from external shocks, such as import control. However, in all those cases the results should be used with caution in view of the fixed coefficients inherent in the analytical approach and the possible cyclical and secular changes in labour productivity. In addition, the job-loss effect estimated by a sample input-output analysis based on fixed coefficients did not necessarily lead to immediate unemployment because of the so-called life-time employment practice in Japanese enterprises. It was further argued in the paper that it was possible through a wage-price repercussion

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analysis to estimate the theoretical increase in production cost due to a change in the exchange rate, an across-the-board uniform wage increase, an increase in crude oil price, etc. It was also noted that the impact from those changes on both the consumer price index and the wholesale price index was estimated on the basis of the decomposition of the input-output model.

36. The Meeting commended the paper and felt that the use of the input-output technique in the analysis of employment and prices was feasible so long as its limitations were kept in view.

C. Constant price tables and deflators

37. The Meeting considered the subject of the constant price input-output tables with special reference to procedures adopted in Japan for their compilation, on the basis of document STAT/MSIOT/6 prepared by a resource person from the Ministry of International Trade and Industry of the Government of Japan. The document was commended by the Meeting. Constant price tables for successive periods provided a means of measuring over time the "quantum" changes of the supply and disposition of goods and services; that is, they represented flows with the price effects of inflation removed. Such tables were compiled in two streams of work in Japan. In one stream, a series of three bench-mark tables were prepared in terms of the latest years' prices (for example, 1970, 1975 and 1980 tables at 1980 prices). In another stream, annual tables were compiled at constant prices using a combination of clerical and mathematical estimation techniques. The base year for that annual series was the latest year for which bench-mark tables were available. In both streams of work, individual flows were revalued by a method relevant to the sector, which could be supported by available data.

38. The problems in compiling constant price tables and their usefulness in time series analysis were considered. One compilation problem related to the balancing of each column sector and each row sector when the use of the "double inflation" method of revaluation was adopted. Under that method, any estimation error of inflators was absorbed in value-added. However, there seemed to be no means of avoiding that problem in the compilation of constant price tables. Another problem related to the analysis using a long time series of constant price tables where there had been substantial structural changes. Despite those problems, the usefulness of the tables was confirmed in assessing the quantum change in industrial structure.

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IV. CONCEPTUAL PROBLEMS OF THE SYSTEM OF NATIONAL ACCOUNTS (SNA) AND INPUT-OUTPUT TABLES

39. For the consideration of agenda item 2, the Meeting had before it document STAT/MSIOT/2 prepared by the United Nations Statistical Office. Another document, STAT/MSIOT/CRP.3, was also distributed in the course of the discussions. The review of SNA standards that was currently being conducted by the United Nations Statistical Office in close collaboration with other international organizations such as the European Economic Community (EEC), the Organisation for Economic Co-operation and Development, the International Monetary Fund (IMF) and the World Bank was introduced to the Meeting. The aims, organization of work involved and the issues needing attention in the review were explained. It was emphasized that there was a need for countries of the ESCAP region to participate actively in the SNA review through country studies, responses to United Nations documents and discussions at regional meetings. Only through concerted efforts on the part of individual countries could the specific national accounting requirements of the countries in the region be reflected in the final revision of the SNA, which was planned to be completed by 1990. It was also noted that the United Nations Statistical Office planned to issue a report on country practices in the field of input-output statistics during 1985.

40. The Meeting considered several issues in the SNA review that were thought to be of particular importance to the field of input-output statistics. It felt that a re-examination of the existing structure of the SNA and the priorities implicitly contained therein could be useful. Some participants suggested that the input-output table could be incorporated as the central organizing framework for data collection and compilation in developing countries as opposed to the current system whereby the emphasis was placed on aggregative statistical measures. The development of such a framework might have priority over the elaboration of other parts of the System or extensions to it. That should be reflected in the concepts and classifications included in the SNA and in the issues that needed to be included in the further discussion of the SNA review.

41. The Meeting noted that the current exclusion in the SNA of intra-establishment deliveries would make the comparability of input-output tables between countries, and also within the same country over time, more difficult. It was suggested that the latter could occur when, in the course of time,

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detailed information on the production costs of establishments became available and was used to identify new producing units (or establishments) and to include in production non-market output which was previously omitted. In that context, it was recommended that the concept of gross output in agriculture as used in the centrally planned economies should be recommended, and attention given to the substantial practical difficulties involved in the separation of that part of household expenses which constituted the cost of production of household marketed and, as appropriate, non-marketed activities. It was also suggested that a study might be undertaken to identify, as part of the gross output, the growing production of software facilities for own use.

42. Reconciliation of the activity and commodity classifications used in the SNA with the Standard International Trade Classification (SITC) and other trade classifications in accordance with the industry of origin principles on which input-output tables were based was considered by the Meeting to be very important in view of the use that was being made of foreign trade statistics in national accounts. Efforts to accomplish such a comparability of classifications through the Joint UNSO/SOEC Working Group on World-level Classifications were welcomed. However, the problems that such changes in the classifications might create for statisticians in the countries of the region with limited capabilities were also noted, particularly if the changes were to require them to deal with increasingly complex and detailed classifications.

43. The Meeting observed that the application of the socio-economic classifications within the SNA (e.g., institutional sector and type of producers) in an input-output context might enhance the stability of input-output coefficients over time. Updating techniques such as the RAS method would thus produce more accurate and reliable results. The Meeting also noted that the further development of socio-economic classifications should take into account the efforts of ILO and others to draw up norms for occupational and other socio-economic groupings. It was suggested that attention could also be paid to identifying and including separately additional non-marketed activities (such as household work) in national accounts estimates or to measuring the level of such activity in complementary socio-economic series. In addition, the practical problems of covering black market activities should be considered.

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44. The possible change from an ownership to a user basis in the classification of gross fixed capital formation by activity was welcomed by the Meeting. However, the practical problems were recognized. Such a change would require adjustment, as appropriate, of the information obtained in respect of unincorporated, quasi-corporate and corporate enterprises and general government where capital expenditures relating to rented equipment were included in the accounts of the units/enterprises owning the relevant equipment. Care should be taken in analysing the effects that that might have on any other national accounting elements, particularly those that reflected the treatment of renting and leasing. Many countries encountered difficulties in the treatment of leasing; Japan, for instance, classified all leased equipment with the owner of the equipment, irrespective of whether such a lease was a financial or an operational lease.

45. The Meeting considered the proposals developed in EEC and OECD to distinguish between two possible types of sectoral consumption classifications; that is, a classification based on who was paying (household, government or enterprise consumption expenditure), and a classification by type of beneficiary (individual or collective consumption). It was suggested that the classification based on who paid might be more appropriate for use in input-output tables.

46. In discussing the coverage of capital formation, it was suggested that it might be most appropriate to include military expenditures in government consumption. Under such a scheme, military equipment should be included in the capital stock only when it was transferred to civilian use. Any other type of treatment could distort the level of capital stock for some analysis. The Meeting noted that the reconciliation accounts of the SNA had not been developed within national statistical systems and that the analytical role of those accounts might be usefully reconsidered.

47. The Meeting discussed the limitation of the existing SNA definition and treatment of the imputed bank service charge for both input-output analysis and for countries providing or receiving significant international financial services. It noted that the United Nations Statistical Office was actively considering alternatives for the definition and treatment of an imputed service charge. In the same context, it was suggested that the treatment of transactions of credit card companies be re-examined.

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V. INTERNATIONAL COMPARABILITY OF INPUT-OUTPUT TABLES

48. Three papers were considered under agenda item 8 (b). In two of those, STAT/MSIOT/7 and STAT/MSIOT/9, prepared by a consultant to the secretariat and by a resource person from the host country, respectively, the methodology, technical problems and uses of multinational input-output tables were discussed. In the third paper, STAT/MSIOT/8, the problems of valuation in an international input-output table and proposed alternative ideas for experimentation were discussed. The Meeting commended all three papers.

49. The Meeting recognized the usefulness of combined multinational input-output tables as an analytical tool for national development planning as well as for promoting international trade and economic co-operation among countries of the region. As a prerequisite, the importance of compiling national input-output tables in which complementary (non-competitive) and competitive imports were separately distinguished, which was in principle based on a unified or standardized criterion in line with the SNA, was emphasized. It was also necessary to establish a comprehensive converter system covering the relevant data source relating to industry and commodity classifications (for example, among International Standard Industrial Classification of all Economic Activities (ISIC), Standard International Trade Classification (SITC) and Brussels Tariff Nomenclature/Customs Co-operation Council Nomenclature (BTN/CCCN)) and the input-output sector classifications of the countries involved in the study.

50. Furthermore, an allocation of imported goods and services to demand sectors should be made on the basis of surveys, such as an import component survey with respect to industry and input structures, with the help of industrial technicians as far as possible. In addition, it was suggested that successive multinational input-output tables in constant price terms be compiled in order to facilitate time series analyses of industrial structural change and international comparability. It was desirable that the same reference year be used in all multinational table compilation projects.

51. Discrepancies in the classification, treatment of flows and accounting year in recorded imports and exports among countries were noted. Discrepancies in international trade could cause a serious problem not only in the compilation of multinational input-output tables but also for an analysis of international trade. In order to reduce such discrepancies, the Meeting suggested that

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some studies on international trade be carried out in both physical and value terms among partner countries. Such studies might examine the causes of discrepancies. That would contribute to an improvement in international trade statistics. A study on international freight and insurance would also be necessary in the region. The Meeting also noted that the preparation of multiregional input-output tables could improve the recording of trade flows for participating countries.

52. The Meeting noted that in an international input-output table, the United States dollar was generally used as the common currency for recording transactions. There might be significant limitations in that procedure if the relative prices of commodities were not uniform between countries. For example, if such prices were not the same among countries participating in a study, then a transformation of values simply using a market exchange rate would include some biases in input-output coefficients. In order to accomplish a consistent valuation of flows in the international input-output table, estimation of a transformation ratio or exchange rate for individual commodities was considered necessary. To estimate that ratio, a few alternative methods were considered and the purchasing power parity was favoured in principle.

53. The Meeting recognized the importance of the valuation problem, and suggested that the differences in the relative prices among countries should be evaluated in the compilation of an international input-output table. In that connection, questions relating to the compilation and reliability of purchasing power parity were raised. It was noted that information on purchasing power parities was in terms of purchasers' prices, whereas input-output flows were measured at producers' values or basic values. It was also noted that purchasing power parity suffered from another major limitation owing to inadequate treatment of "comparison-resistant" goods and services. Some valuation adjustments were therefore necessary.

VI. USES OF INPUT-OUTPUT TABLES

A. Utilization of input-output tables in economic planning, analysis, policy and projections

54. In considering item 9, the Meeting had before it document STAT/MSIOT/10 prepared by a resource person from the Government of Japan. It was argued in the paper that simple input-output analysis had come to be recognized as not sufficient

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for estimating the total effects in the economy. There was therefore a shift to using more comprehensive computer models containing input-output tables. Two examples of such models were the Medium-term Model and the Long-term Model. Both models were multisectoral and utilized input-output tables and computer-processing facilities. As an illustrative application of that extended input-output framework, an analysis that related final demands, human basic needs, and the disposition of 24 hours, was presented. The Meeting commended the paper and its exposition.

55. The Meeting observed that in order to make up for the defects due to the assumption of fixed coefficients, some special measures were taken in the application of the models. The "turn-pike" model laid the foundation for the long-term model. In the medium-term model, the demand-supply condition was also an explanatory factor for price determination. It also required a very large volume of data and estimation work but not much of a computing burden. The contrary was the case with the long-term model. The Meeting also noted that the development of the models followed mainly the theoretical requirements of economic analysis and the availability of relevant data owing to the implementation of the SNA in data collection work.

B. Uses of input-output tables in developing countries

56. The Meeting considered three documents under agenda item 9 (b), STAT/MSIOT/11, STAT/MSIOT/12 and STAT/MSIOT/13, which were prepared by resource persons from the host country. All the papers were commended by the Meeting.

57. With regard to document STAT/MSIOT/11, the Meeting took note of the proposed framework of growth accounting for both supply and demand sides of output, following closely the framework of input-output tables. Growth accounting from the supply side was presented first for individual industries and then for the aggregate national economy from the point of view of productivity measurement. Growth accounting from the demand side was derived as a combination of the analysis of import substitution and the constant-market-shares analysis of export growth mainly from the point of view of the latter. The corresponding measurements were given for the Philippine economy to illustrate the theoretical framework.

58. The document also proposed an analytical framework for the changes in input coefficients based on a decomposition formula which was closely related to the RAS method. That framework was illustrated by data from the

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Japanese economy. The Meeting was of the opinion that the framework suggested was pragmatic and lucid and could have a useful application in the countries.

59. The paper entitled "An input-output analysis of newly implemented iron-steel industry in West Malaysia" (STAT/MSIOT/12) contained presentations from a study by the author on linkage effects of Malayawata Steel and Malayawata Charcoal Berhad. In the study, linkage dispersion was assumed to be instantaneous, but in reality there were some lags in the dispersion process. Those could be checked by calculating the dispersion step by step, using a power series. Second, the structural change of linkages could be observed by applying a factor decomposition model to data for the two different reference years and seeing the linkage dispersion between two periods.

60. The Meeting recognized that induced employment in the steel plant might induce additional consumption which in turn would induce additional production. That could, however, be analysed by making consumption endogenous in the model.

61. In the paper entitled "The structure of the economic development process: input-output analysis of the Indonesian economy" (STAT/MSIOT/13), the author tried, by utilizing input-output tables of Indonesia, to clarify the characteristic changes of the structure of the interdependency of inter-industrial activities on each kind of final demand and the structure of repercussion of each kind of final demand on industrial activities in the context of industrialization in Indonesia. He proposed a new index called the "Give-and-take ratio" in order to analyse the intensity of inter-industrial linkages. By using that index, it was possible to identify the excess receipt and payment industries that might emerge in the course of economic development. He also analysed the factors underlying changes in forward and backward repercussion in each industry during the economic development proces. In that way, it was possible to bring out several facts which revealed some interesting characteristics in the economic development process in the Indonesian economy.

C. Use of input-output tables in energy analysis

62. The Meeting commended the paper entitled "Use of input-output tables - Energy analysis of Japanese industries: a time series analysis" (STAT/MSIOT/14), which was prepared by a resource person from the host country. The author presented the methodology as well as estimates of energy conservation in

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Japanese industries during the period 1965-1980 and also explained causes for the decrease in the direct conservation of energy during the periods 1975-1977 and 1979-1980, namely, that a lag was noted in the introduction of new technologies after the rise in oil prices and the economic decline around 1975 which seriously affected the capacity utilization ratios of most energy-intensive industrial plants. He further explained that in view of non-availability of data on investment matrices and converters, energy consumed for capital formation was not taken into account. The Meeting also noted that own account energy production was not specifically modelled but that such production was not expected to be analytically significant to the results before the Meeting.

VII. COMPUTER SUPPORT FOR INPUT-OUTPUT TABLES

63. A paper entitled "Software packages for compilation and use of input-output tables" (STAT/MSIOT/15) was presented to the Meeting for discussion. The topic was also included in the list of subjects for country reports which contained descriptions of computer use in respective countries. The paper also contained a review of practices in Japan showing the computer's role in the compilation of input-output tables. Various forms for data entry, lists for reconciliation of estimates and data file formats were introduced for reference purposes. The Meeting commended the paper.

64. The Meeting recognized that computer support to the input-output work of each country depended on the compilation methodology adopted in that country, that often implied difficulty in obtaining specific packages of computer programmes from one agency that could be readily applied to the work of another agency. The Meeting also noted the substantial difference between countries in the availability and models of computer hardware.

65. The Meeting took note of the usefulness of a software package called "SAS" (Statistical Analysis System), in addition to CONCOR, COCENTS and TPL developed in the United States, and of UNEDIT and X-TALLY of the United Nations, for handling raw and vector data. The practices of mathematical balancing of rows and columns of the input-output table which included the RAS, modified RAS and Lagrange methods and required computer processing facilities were also noted by the Meeting.

66. The Meeting considered the possible transferability of software programmes already developed in many countries. A proposal was accepted in principle that the ESCAP secretariat might collect and disseminate information on software packages and mathematical balancing techniques in use in the countries of the region.

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VIII. POSSIBLE FUTURE ACTIVITIES

67. Following the detailed discussions of substantive items, the Meeting considered what possible activities might be undertaken thereafter, by both the countries and the secretariat, to maintain as well as enhance the current development of input-output work in the region. A secretariat paper (STAT/MSIOT/CRP.2) presented to the Meeting provided some suggestions keeping in view the objectives of the Meeting.

68. The Meeting was also expected to provide some contributions to the current SNA review by the United Nations Statistical Office, perhaps through identification of activities relevant to input-output tables to be undertaken in the region during the next year or so. Topics needing feasibility studies by developing countries were the following: country practices in institutional sectoring; treatment, coverage and valuation of informal activities; use of industry and household survey data in national accounts; development of public sector accounts and reconciliation and/or harmonization of Government Finance Statistics (GFS) and SNA standards regarding government accounts; balance of payments and SNA standards regarding external transactions; regional accounts; definition and treatment of imputed bank service charges; and treatment of the terms of trade. The Meeting felt that selected countries of the region might wish to undertake or be asked to undertake studies on selected topics with a view to suggesting modifications for the SNA review. The Meeting also recognized that duplication of investigatory work between countries should be kept to a minimum. The secretariat's regional advisory services could assist countries in those studies as feasible. In that way, the views and the needs of the developing countries of the ESCAP region could be reflected and incorporated in the review.

69. The Meeting recalled the dearth in many countries of the region of trained personnel with expertise in input-output compilation of analysis. Training was therefore absolutely vital. The Meeting noted that SIAP, while currently including some instruction on input-output matters in its general course, was willing to devote one of its advanced courses to the subject in 1986. It could also organize country courses on the subject on request. The Economic Development Institute (EDI) of the World Bank could also conduct courses in Washington and, when requested to do so, in member countries. A country course could also include participants from neighbouring member countries. Other centres such as the Bureau of Economic Analysis of the United States Department of Commerce, and IMF in Washington also ran training courses. However, participants had to provide their own costs for the courses organized by the Department of Commerce.

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70. The Meeting recognized that observational and on-the-job types of training also had an important role. Therefore, developing countries engaged in input-output work could exchange personnel within the technical co-operation among developing countries (TCDC) programme. Developed countries could also assist bilaterally through secondment or exchange visits of their personnel to developing countries for short periods. The services of scholars from academic and research centres could also be available provided suitable funding was arranged.

71. Noting the effectiveness of regional advisory services of the secretariat, the Meeting suggested that a regional adviser on input-output analysis could do useful work. It requested the secretariat to explore with donor countries and international/intergovernmental organizations the prospects for the financing of such an adviser.

72. The Meeting was informed of the utility and effectiveness of the multiregional input-output table, particularly in assessing international trade. The table had been compiled seven years earlier under the sponsorship of the United Nations and with a grant of $US600,000 from the Netherlands. A similar study, incorporating the techniques developed since and catering for expected user needs, should be attempted once again, since such researches were important and useful. The current cost might be around $US1 million, and that cost might well be shared by several large international corporations if they were approached with a convincing proposal.

73. Recognizing the need for adequate data for input-output work, especially data relating to household and informal sectors, the Meeting supported the National Household Survey Capability Programme (NHSCP) of the United Nations. The Programme was particularly commendable since it accepted national priorities and integrated users' needs. For other productive and consuming sectors, sample surveys and censuses were also required. The Meeting suggested that data collections be organized to improve the overall quality and reliability of data, and be co-ordinated with the country programme for the compilation of input-output tables.

74. With regard to a data centre for input-output tables, the Meeting noted that the United Nations Statistical Office was already planning to organize such a centre. That Office also planned appropriate publications. The Meeting thus considered it inappropriate for the ESCAP secretariat to enter

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into those areas. The secretariat, however, could identify the input-output focal centres in the countries of the region, and compile a list of studies being undertaken by them and of the experts associated with those studies. It could also prepare an inventory of computer software packages available and in use in the countries. ESCAP might also act as a depository of technical papers, journals and other similar input-output related materials, with the objective of disseminating information about them among the interested countries.

75. The Meeting recognized that funds for statistical activities and programmes were subject to strict budgetary constraints in every country. Resources for input-output work were not exempt from that general constraint. However, there was some flexibility in the use of resources allocated to input-output work and therefore there was the need to evaluate data sources and alternative compilation methodologies carefully and to decide judiciously on priorities for the use of scarce resources. For the support of appropriations in national budgets for input-output and related statistical work, the Meeting suggested that statistics produced must at least be timely and accurate. They must also be lucidly presented so that policy-makers were motivated to utilize directly the available input-output information for policy and planning purposes.

76. Finally, the Meeting observed that some very valuable documentation was prepared and presented at its sessions. Country statements were also highly informative. The two eminent persons gave highly educative expositions on their selected topics. Those materials should have a lasting value if a summarized and edited version could be produced in a publication by the secretariat. The Meeting recognized that some resources would be needed for that purpose; it urged the secretariat to explore possible sources.

Annex

LIST OF DOCUMENTS

Document No.	Title
STAT/MSIOT/L.1	Provisional agenda
STAT/MSIOT/L.2	Annotated provisional agenda
STAT/MSIOT/1	Compilation of input-output tables: data and methods
STAT/MSIOT/2	Conceptual problems of System of National Accounts (SNA) and input-output tables - SNA review topics that might affect the design and construction of input-output tables
STAT/MSIOT/3	Input-output tables in the ESCAP region
STAT/MSIOT/4	Outline of fixed capital matrix and employment-occupation matrix
STAT/MSIOT/5	Applications of input-output tables in the field of labour affairs
STAT/MSIOT/6	Compilation of input-output tables: constant price tables and deflators
STAT/MSIOT/7	International comparability of input-output tables: combined input-output tables for ASEAN countries - A case of Japan-Korea table
STAT/MSIOT/8	Some problems on price evaluation in an international input-output table
STAT/MSIOT/9	Methodology and problems of the compilation of international input-output tables for ASEAN countries, 1975
STAT/MSIOT/10	Uses of input-output tables: utilization of input-output tables in economic planning, analysis, policy and projections
STAT/MSIOT/11	Uses of input-output tables: growth accounting based on input-output tables
STAT/MSIOT/12	Uses of input-output tables: an input-output analysis of newly implemented iron-steel industry in West Malaysia
STAT/MSIOT/13	Uses of input-output tables: the structure of the economic development process - Input-output analysis of the Indonesian economy

Document No.	Title
STAT/MSIOT/14 and Add.1	Uses of input-output tables: energy analysis of Japanese industries - A time series analysis
STAT/MSIOT/15	Computer support: software packages for compilation and use of input-output tables
STAT/MSIOT/CRP.1	Classical, Neoclassical and Keynesian in the Leontief Framework
STAT/MSIOT/CRP.2	Possible future activities
STAT/MSIOT/CRP.3	Draft report on the review of the System of National Accounts
STAT/MSIOT/CRP.4	Estimating input-output tables from scarce data: experiences of the United States Census Bureau's Center for International Research
	Country papers
Stat/MSIOT/CRP.5	Australia
STAT/MSIOT/CRP.6	Fiji
STAT/MSIOT/CRP.7	Hong Kong
STAT/MSIOT/CRP.8	India
STAT/MSIOT/CRP.9	Indonesia
STAT/MSIOT/CRP.10	Japan
STAT/MSIOT/CRP.11	Malaysia
STAT/MSIOT/CRP.12	Philippines
STAT/MSIOT/CRP.13	Republic of Korea
STAT/MSIOT/CRP.14	Singapore
STAT/MSIOT/CRP.15	Sri Lanka
STAT/MSIOT/CRP.16	Thailand
STAT/MSIOT/CRP.17	An empirical study on projecting and forecasting the input coefficient matrix in the Leontief Model
STAT/MSIOT/CRP.18	Energy intensities in the industrial sector: an application of input-output model for the Indian economy

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